

an address counter that outputs a count in response to a clock signal output from said printer; and

a storage element that is sequentially accessed based on the count output from said address counter and has a storage area, in which plural pieces of specific information are stored in a readable, writable, rewritable and non-volatile manner.

73. (Twice Amended) A storage device in accordance with claim 72, wherein the storage area has a first storage area and a second storage area, wherein the first storage area stores a plurality of read only information, and wherein the second storage area is arranged at a place accessed for rewriting prior to the first storage area and stores information relating to a quantity of ink kept in said ink cartridge.

REMARKS

Claims 1-9, 11-20 and 23-114 are pending in this application. Claims 4, 24-34, 45-54, 59-71 and 78-93 stand withdrawn from consideration as being directed to a non-elected invention or species of invention, claims 7-9 and 40-44 have been objected to, and claims 1-3, 5, 6, 11-20, 23, 35-39, 55-58 and 72-77 have been rejected. Claims 94-114 have been added, and the specification and claims 1, 15, 35, 45, 47, 72 and 73 have been amended. Claims 1, 15, 26 (withdrawn), 35, 45 (withdrawn), 47 (withdrawn), 55, 72, 78 (withdrawn), 87 (withdrawn), 89 (withdrawn), 98, 100, 108 and 114 are independent.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is entitled "Version With Markings To Show Changes Made".

The Examiner is thanked for the indication of allowable subject matter in claims 7-9 and 40-44. Those claims have been maintained unchanged, since, as explained below, the claims from which they respectively depend are themselves allowable over the art of record.

Support for newly-presented claims 94-114 can be found throughout the application as originally-filed, for example, at page 36-39 of the specification, and in Figs. 7-9. No new matter has been added.

**The Objections to
the Specification**

The specification was objected to on grounds the label "182" at page 35, lines 11 and 13, should read --192--.

The Examiner is thanked for calling attention to this point. The specification has been suitably revised.

The specification also was objected to as failing to provide a proper antecedent basis for certain claimed subject matter. Specifically, the Office Action stated that the language in claims 3 and 38 providing that the ink quantity information storage area has a storage capacity of at least three bytes was not supported by the specification.

Applicants respectfully disagree with, and traverse, this rejection. The claim feature in question finds support in the specification; by way of example only, and not limitation, the disclosure beginning at page 63, line 14, states that "information regarding the remaining quantities of cyan, magenta and yellow inks are allocated to the first 3 bytes (24 bits)". It also will be understood that information for other colors of ink could be stored in this manner as well.

Claims 3 and 38 are original claims, and so provide their own written description, as the M.P.E.P. itself recognizes. M.P.E.P. § 608.01(l), reads, in pertinent part:

In establishing a disclosure, applicant may rely not only on the description and drawing as filed but also on the original claims if their content justifies it.

Where subject matter not shown in the drawing or described in the description is claimed in the application as filed, and such original claim itself constitutes a clear disclosure of this subject matter, then the claim should be treated on its merits, and requirement made to amend the drawing and description to show this subject matter. The claim should not be attacked either by objection or rejection because this subject matter is lacking in the drawing and description. It is the drawing and description that are defective, not the claim.

For all the foregoing reasons, favorable reconsideration and withdrawal of these objections is respectfully requested.

**The Rejection Under
35 U.S.C. § 102**

Claims 1-3, 5, 11-20, 23, 35-38, 55-58 and 72-77 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,610,635 to Murray et al. Applicant respectfully traverses this rejection and submits the following arguments in support thereof.

Applicants' invention, as described in claim 1, involves an ink cartridge configured to be detachably attached to a printer. This cartridge has an ink reservoir that keeps ink used for printing and a storage unit stores specific information in a readable, writable, and non-volatile manner. The specific information can be ink quantity-relating information relating to a quantity of ink kept in said ink reservoir. The storage unit is sequentially accessed in synchronism with a clock signal, and has an ink quantity information storage area storing the ink quantity-relating information, and the ink quantity information storage area is located at a specific area accessed for rewriting first by the printer.

According to claim 15, this invention pertains to an ink cartridge configured to be detachably attached to a printer, and this ink cartridge has an ink reservoir that keeps ink used for

printing, and a storage unit which stores specific information in a readable, writable, and non-volatile manner and which is sequentially accessed in synchronism with a clock signal. The storage unit has a first storage area in which read only information is stored, and a second storage area arranged at a location accessed for rewriting prior to the first storage area and in which rewritable information is stored. The specific information can be information relating to the quantity of ink kept in the ink reservoir.

Another aspect of this invention, as set out in claim 35, involves a method of writing plural pieces of specific information into an ink cartridge configured to be detachably attached to a printer and having a storage element. This is done by providing the plural pieces of specific information that are to be written into the storage element by the printer, and the plural pieces of specific information can be information relating to a quantity of ink kept in the ink cartridge, and rewriting the ink quantity-relating information into the storage element preferentially over the other pieces of specific information.

Still another aspect of this invention is an ink jet printer having an ink cartridge, which is detachably attached to a printer main body and in which ink is kept, and the printer main body that causes the ink kept in the ink cartridge to be ejected from a print head to a printing medium, so as to print on the printing medium. The ink cartridge includes a sequential access type storage device having a storage unit and an address counter that carries out either a count-up or a count-down operation in response to a clock signal in the course of data transmission between the storage unit and printer main body. The storage unit in the storage device has a first storage area, in which read only data are stored and which is only read by the printer main body, and a second storage area, in which rewritable data are stored and which is accessed prior to the first storage area and transmits data to and from the printer main body.

Also, the ink jet printer has a data input-output unit that carries out reading and writing operations in response to a clock signal.

Yet another aspect of this invention is a storage device mounted on an ink cartridge, which is configured to be detachably attached to a printer. The storage device has an address counter that outputs a count in response to a clock signal output from the printer. A storage element is sequentially accessed based on the count output from the address counter and has a storage area, in which plural pieces of specific information are stored in a readable, writable, rewritable and non-volatile manner.

As will now be explained, there are important and non-obvious differences between the claimed invention and Murray, and Murray does not suggest all the features of each of the rejected claims.

Murray discloses an ink cartridge which, admittedly, has a memory for storing information. It should be noted, however, that Murray actually only teaches ink cartridges that store single-color inks. Although the Office Action states at page 4 that the ink reservoir has at least three ink chambers, that is in fact incorrect. Fig. 1, the drawing cited by the Office Action in support of this interpretation, depicts an ink jet printer 10 in which discrete ink cartridges 40 are mounted on a common print carriage 22 (see col. 4, lines 55-64). Further, it should be noted that the Office Action, in the subsequent rejection under 35 U.S.C. § 103, admits that "Murray et al. does not disclose the ink reservoir having at least five ink chambers, in which at least five different color inks are kept respectively" (Office Action, p. 5).

The Office Action also asserts that Murray teaches an ink quantity information storage area storing the ink-quantity relating information as an "area of 48" (Office Action, pp. 3-4). That, however, is incorrect. Murray only teaches that certain information regarding the ink

cartridge is stored in memory element 48. The stored information has an address. See col. 6, line 38, through col. 7, line 10; col. 8, line 34, through col. 10, line 17; and col. 12, line 64, through col. 13, line 35.

Nowhere, however, does Murray even suggest that the retained information be stored in specific regions of the memory element, much less that different types of retained information (i.e., information that changes over time, such as information relating to the amount of ink versus information that remains constant, such as information relating to the color of the ink) be stored in the memory element in different places according to the type of information that is stored.

The following passage from Murray, col. 8, lines 34-57, makes it clear that the discussion of the data's address is general and refers only to the inherent position of the data in the memory element, and particular types of data are not stored in any specific location:

In FIG. 5, if the command bits from the parallel word 105 indicate that data, such as ink type, ink color, lot number of the ink, etc., is to be stored in the memory storage element 48, the data bits from the parallel word 105 delivered to the logic block 86 contain the address location and the data that is to be stored in the storage element 48. Upon receiving the store data command, the logic block 86 first routes the address of the location where the data is to be stored to the memory storage element 48. Then the logic block 86 routes the data to the memory storage element 48 for storage.

If the command bits indicate that data, such as ink color, data from a spectral analysis of the ink, initial amount of ink stored in the cartridge body, remaining ink capacity, etc., is to be retrieved from the memory storage element 48, the data bits delivered to the logic block 86 contain the address location of the data that is to be retrieved from the storage element 48. Upon receiving the retrieve data command, the logic block 86 processes the data request and routes the address of the requested data to the memory storage element 48. The requested data from the memory storage element 48 is returned to the logic block 86 for routing to an external system 91.

Applicants also do not agree with the assertion at page 4 of the Office Action that Murray's teaching of updating a memory with new data is the same as Applicants' writing ink quantity-relating information into the storage element preferentially over other pieces of specific information; Murray does not discriminate between the types of data, meaning that one following Murray's teachings would be equally likely to update the memory element with other types of information., in which case the ink quantity relating information would be discriminated against, not preferred.

The remaining rejected claims, claims 2, 3, 5, 11-14, 16-20, 23, 36-38, 56-58 and 73-77 all depend from and so incorporate by reference the features of the independent claims already shown to avoid Murray. These claims are therefore patentable over Murray at least for the same reasons as their respective base claims.

New claims 94-114 also are patentable over the cited art for reasons comparable to those given above.

It is well-accepted that where, as here, a reference fails to identically disclose all the features of a claimed invention, that reference cannot anticipate the invention. Accordingly, this rejection is not well-taken and must be withdrawn.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are favorably requested.

The Rejection Under
35 U.S.C. § 103

Claims 6 and 39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Murray et al. in view of U.S. Patent No. 6,086,193 to Shimada et al. Applicants respectfully traverse this rejection and submit the following arguments in support thereof.

Claims 6 and 39 depend, respectively, from claims 1 and 35, and so incorporate by reference all the features of those base claims, including the features previously shown to avoid Murray.

The Office Action asserts that Murray discloses, at col. 10, lines 1-7, that the ink quantity information storage area has a capacity of at least five bytes. That, however, is wrong - the passage in question does not state what the capacity of an ink quantity information storage area is (as explained above, Murray in fact does not teach such an area at all), much less that it is 5 bytes, as presently claimed. All this passage discusses is different types of data which can be stored.

The Office Action is also incorrect insofar as it asserts Murray teaches an ink quantity information storage area having a plurality of memory divisions. Should the Examiner feel otherwise, the Examiner is respectfully requested to identify with specificity where in Murray this aspect of the invention is taught.

Shimada is only cited as teaching an ink reservoir with five ink chambers. The Examiner does not contend that Shimada suggests the aspects of the claimed invention just shown to patentably distinguish over Murray. Thus, Shimada does not remedy Murray's above-noted deficiencies.

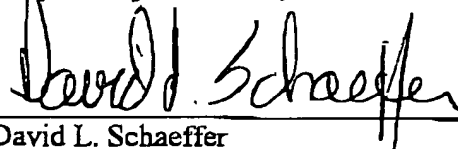
For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection is respectfully requested.

CONCLUSION

The Commissioner is authorized to charge any fees now or hereafter due in connection with the prosecution of this application to Deposit Account No. 19-4709.

Applicant has made a diligent effort to place the application in condition for allowance and respectfully submits that the claims as now presented are in condition for immediate allowance. If, however, the Examiner feels she cannot issue an immediate Notice of Allowance, the Examiner is respectfully requested to contact the undersigned attorney to discuss the outstanding issues.

Respectfully submitted,



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Attachment: "Version With Marking To Show Changes Made"

VERSION WITH MARKING TO SHOW CHANGES MADE**IN THE SPECIFICATION:**

Replace the paragraph beginning at page 35, line 8, with the following new paragraph:

--The ink cartridge 107K is attached to the cartridge attachment unit 18 according to the following procedure. The procedure first places the ink cartridge 107K on the cartridge attachment unit 18. The procedure then presses down a lever [182] 192, which is fixed to a rear wall 188 of the cartridge attachment unit 18 via a support shaft 191 as shown in Fig. 5, to be over the ink cartridge 107K. The press-down motion of the lever [182] 192 presses the ink cartridge 107K downward, so as to make the ink supply unit 175 fitted onto the recess 183 and make the needle 181 pierce the ink supply unit 175, thereby enabling a supply of ink. As the lever 192 is further pressed down, a clutch 193 disposed on a free end of the lever 192 engages with a mating element 189 disposed on the cartridge attachment unit 18. This fixes the ink cartridge 107K to the cartridge attachment unit 18. In this state, the plurality of connection terminals 174 on the storage element 80 in the ink cartridge 107K electrically connect with the plurality of electrodes 185 on the cartridge attachment unit 18. This enables transmission of data between the printer main body 100 and the storage element 80.--

IN THE CLAIMS:

Add claims 94-114:

--94. (New) An ink cartridge according to claim 1, wherein the ink quantity-relating information is written in the storage area before other information is written in the storage area.

95. (New) An ink cartridge according to claim 1, wherein when the printer reads information from the ink cartridge, the printer accesses the ink quantity information storage area

96. (New) An ink cartridge according to claim 1, wherein when the printer reads information from the ink cartridge, the printer accesses the ink quantity information storage area before accessing other portions of the storage unit.

97. (New) An ink cartridge according to claim 1, wherein when the printer reads information from the ink cartridge, the printer accesses the ink quantity information storage area after accessing an other portion of the storage unit.

98. (New) An ink cartridge configured to be detachably mountable on a printer, comprising:

an ink reservoir for keeping ink; and

a non-volatile serial access memory being sequentially accessed from an access start position in synchronism with a clock signal, the memory having a first memory area for storing data not to be updated according to use of the ink cartridge and a second memory area for storing data to be updated according to use of the ink cartridge,

wherein the second memory area has a specific area for storing ink quantity data related to consumption of the ink, the specific area being located at a front end of the second memory area which is to be written first in writing data to the second memory area.

99. (New) An ink cartridge in accordance with claim 98, wherein the second memory area is located at a first half of an entire memory space of the non-volatile serial access memory.

100. (New) An ink cartridge configured to be detachably attached to an ink-jet printer, comprising:

an ink storage reservoir; and

a non-volatile serial access storage element that stores data, the storage element having;

a first storage area for storing read-only data at a first address, and

a second storage area for storing rewritable data at a second address, the second address being lower than the first address.

101. (New) An ink cartridge according to claim 100, wherein the second address being lower than the first address means that the second address is closer to a beginning of the storage device than the first address.

102. (New) An ink cartridge according to claim 100, wherein the rewritable data reflects a quantity of ink remaining in the ink storage reservoir.

103. (New) An ink cartridge according to claim 100, wherein the read-only data reflects at least one of a time at which the ink cartridge was unsealed, a version of the data stored, a type of ink contained in the ink storage reservoir, a time at which the ink cartridge was manufactured, a serial number of the ink cartridge, and an indication as to whether the ink cartridge is new or recycled.

104. (New) An ink cartridge according to claim 100, wherein a maximum amount of the first data that the first storage area can store is equal to a maximum amount of the second data that the second storage area can store.

105. (New) An ink cartridge according to claim 100, wherein at least one of the read-only data and the rewritable data comprises a plurality of data records, and the data records are sequentially arranged.

106. (New) An ink cartridge according to claim 100, wherein a first said data record has a first size and a second said data record has a second size, and the first and second sizes are different.

107. (New) An ink cartridge according to claim 100, wherein the rewritable data reflects an amount of ink consumption in the ink storage reservoir, said amount of ink consumption having an initial value in a range from zero to a predetermined value.

108. (New) A method of providing a plurality of data in an ink cartridge that is configured to be detachably mountable on a printer, the ink cartridge having a non-volatile serial access memory, comprising the steps of:

first, storing read-only data at a first address in the memory; and

second, storing rewritable data at a second address in the memory, wherein the second address is closer to a beginning of the storage device than the first address.

109. (New) A method according to claim 108, wherein the rewritable data reflects a quantity of ink contained in the ink cartridge.

110. (New) A method according to claim 108, wherein the read-only data reflects at least one of a time at which the ink cartridge was unsealed, a version of the data stored, a type of ink contained in the ink storage reservoir, a time at which the ink cartridge was manufactured, a serial number of the ink cartridge, and an indication as to whether the ink cartridge is new or recycled.

111. (New) A method according to claim 108, wherein a maximum amount of the read-only data that is stored is equal to a maximum amount of the rewritable data that is stored.

112. (New) A method according to claim 108, wherein at least one of the read-only data and the rewritable data comprises a plurality of data records, and the data records are sequentially arranged.

113. (New) A method according to claim 112, wherein a first said data record has a first size and a second said data record has a second size, and the first and second sizes are different.

114. (New) A method of retrieving data from an ink cartridge that is configured to be detachably mountable on a printer, the ink cartridge having a non-volatile serial access memory, the memory containing read-only data at a first address and rewritable data at a second address in the memory, wherein the second address is closer to a beginning of the storage device than the first address, comprising the step of:

reading the second data without reading the first data.--.

Amend claims 1, 15, 35, 45, 47, 72 and 73:

1. (Twice Amended) An ink cartridge configured to be detachably attached to a printer, said ink cartridge comprising:

an ink reservoir in which an ink used for printing is kept; and

a storage unit storing specific information in a readable, writable, and non-volatile manner, wherein the specific information comprises an ink quantity-relating information relating to a quantity of ink kept in said ink reservoir,

wherein the storage unit is sequentially accessed in synchronism with a clock signal, and has an ink quantity information storage area storing the ink quantity-relating information, and wherein the ink quantity information storage area is located at a specific area accessed for rewriting first by said printer.

15. (Twice Amended) An ink cartridge configured to be detachably attached to a printer, said ink cartridge comprising:

an ink reservoir in which an ink used for printing is kept; and

a storage unit storing specific information in a readable, writable, and non-volatile manner and being sequentially accessed in synchronism with a clock signal, said storage unit having a first storage area, in which a plurality of read only information is stored, and a second storage area, which is arranged at a location accessed for rewriting prior to the first storage area and in which rewritable information is stored,

wherein the specific information comprises information relating to a quantity of ink kept in said ink reservoir.

35. (Twice Amended) A method of writing plural pieces of specific information into an ink cartridge, said ink cartridge being configured to be detachably attached to a printer and having a storage element, said method comprising the steps of:

(a) providing the plural pieces of specific information that are to be written into said storage element by said printer, wherein the plural pieces of specific information comprises information relating to a quantity of ink kept in said ink cartridge; and

(b) ~~writing~~ rewriting the ink quantity-relating information into said storage element, preferentially over the other pieces of specific information.

45. (Twice Amended) A method of writing specific information into an ink cartridge, said ink cartridge being configured to be detachably attached to a printer and having a storage element, said method comprising the steps of:

(a) providing the specific information that is to be written into said storage element by said printer, the specific information comprising information relating to a quantity of ink kept in said ink cartridge;

(b) ~~writing~~rewriting the ink quantity-relating information into a plurality of ink quantity information memory divisions, which are included in said storage element; and

(c) writing write complete information into a write complete information storage area when the writing operation of the ink quantity-relating information into each of the ink quantity information memory divisions has been completed, wherein the write complete information storage area is provided corresponding to each of the ink quantity information memory divisions in said storage element.

47. (Twice Amended) A method of writing specific information into an ink cartridge, said ink cartridge being configured to be detachably attached to a printer and having a storage element, said method comprising the steps of

(a) providing the specific information that is to be written into said storage element by said printer, the specific information comprising information relating to a quantity of ink kept in said ink cartridge;

(b) ~~writing~~rewriting first ink quantity-relating information into a first ink quantity information memory division, which is included in said storage element;

(c) writing first write complete information into a first write complete information storage area when the writing operation of the first ink quantity-relating information into the first ink quantity information memory division has been completed, wherein the first write complete

information storage area is provided corresponding to the first ink quantity information memory division in said storage element;

(d) ~~writing~~ rewriting second ink quantity-relating information into a second ink quantity information memory division after the writing operation of the first write complete information into the first write complete information storage area has been completed, wherein the second ink quantity information memory division is included in said storage element; and

(e) writing second write complete information into a second write complete information storage area when the writing operation of the second ink quantity-relating information into the second ink quantity information memory division has been completed, wherein the second write complete information storage area is provided corresponding to the second ink quantity information memory division in said storage element.

72. (Twice Amended) A storage device mounted on an ink cartridge, which is configured to be detachably attached to a printer, said storage device comprising:

an address counter that outputs a count in response to a clock signal output from said printer; and

a storage element that is sequentially accessed based on the count output from said address counter and has a storage area, in which plural pieces of specific information are stored in a readable, writable, rewritable and non-volatile manner.

73. (Twice Amended) A storage device in accordance with claim 72, wherein the storage area has a first storage area and a second storage area, wherein the first storage area stores a plurality of read only information, and wherein the second storage area is arranged at a

place accessed for rewriting prior to the first storage area and stores information relating to a quantity of ink kept in said ink cartridge.